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Segment No. 18-37-01

WA-37-1010

WAPATO WASTEWATER TREATMENT PLANT
CLASS II INSPECTION

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September 1989

ABSTRACT

A Class II inspection was conducted at the Wapato Wastewater Treatment Plant (WTP) on October 5-7, 1987. The effluent was within permit limitations during the inspection. Laboratory samples did not correlate well with Ecology's. Composite samplers need to be installed to obtain a more representative influent sample/load and a consistent sampling methodology. The treatment plant exceeded the "85% of design" criteria for influent loading. Therefore, a plan and schedule for continuing to maintain adequate treatment capacity should be submitted to Ecology.

INTRODUCTION

Wapato is a community of approximately 3500 located in south-central Washington, fifteen miles southeast of Yakima (Figure 1). Wapato's WTP consists of headworks with two parallel comminutors, aerated grit chamber, primary clarifier, two parallel trains of two-stage rotating biological contactors (RBC), two final clarifiers, and chlorine contact chamber (Figure 2). Disinfected effluent discharges to Wapato Irrigation Drain No. 2 in accordance with NPDES Permit Number WA-005022-9. The irrigation drain enters the Yakima River about 25 miles downstream. Sludge is aerobically digested, dried on sludge drying beds, and is currently stockpiled on private land.

On October 5, 6, and 7, 1987, a Class II inspection was conducted at the plant site by Don Reif and Carolyn Abshire, Washington State Department of Ecology, Environmental Investigations and Laboratory Services, Compliance Monitoring Section. Assisting from the WTP were Dick Munson and Nibbs Menard. The objectives were:

- Collect samples and measure flows to determine plant loading and efficiency.
- Perform a laboratory evaluation and split samples to check adherence to accepted protocols and analytical accuracy.
- Determine compliance with NPDES permit parameters, and compare plant loading with design parameters.
- Sample the Wapato Industrial Ditch (WID) for the fungicides Sodium salt of orthophenylphenol (SOPP) and Diphenylamine (DPA).

METHODS

Twenty-four hour composited samples were collected on the influent and chlorinated effluent (Figure 2), approximately 200 mL at 30 minute intervals. Grab samples were collected at the same locations, and also at the primary effluent and RBC train effluents. A grab sludge sample was collected from the aerobic digesters. Samples were also collected from the Wapato Industrial Ditch near the outskirts of town.

Wapato's WTP collects influent and effluent permit samples from grab composites. Samples are collected every one and a half hours (1.5 hr) for eight hours. The volume of the initial and last samples is 125 mL and 250 mL in between. Ecology's complete sampling schedule is listed in Table 1.

RESULTS AND DISCUSSION

General Results

Ecology's analytical results are summarized in Table 2. The plant was providing good Biochemical Oxygen Demand (BOD_5) and Total Suspended Solids (TSS) removal. Partial nitrification was also achieved.

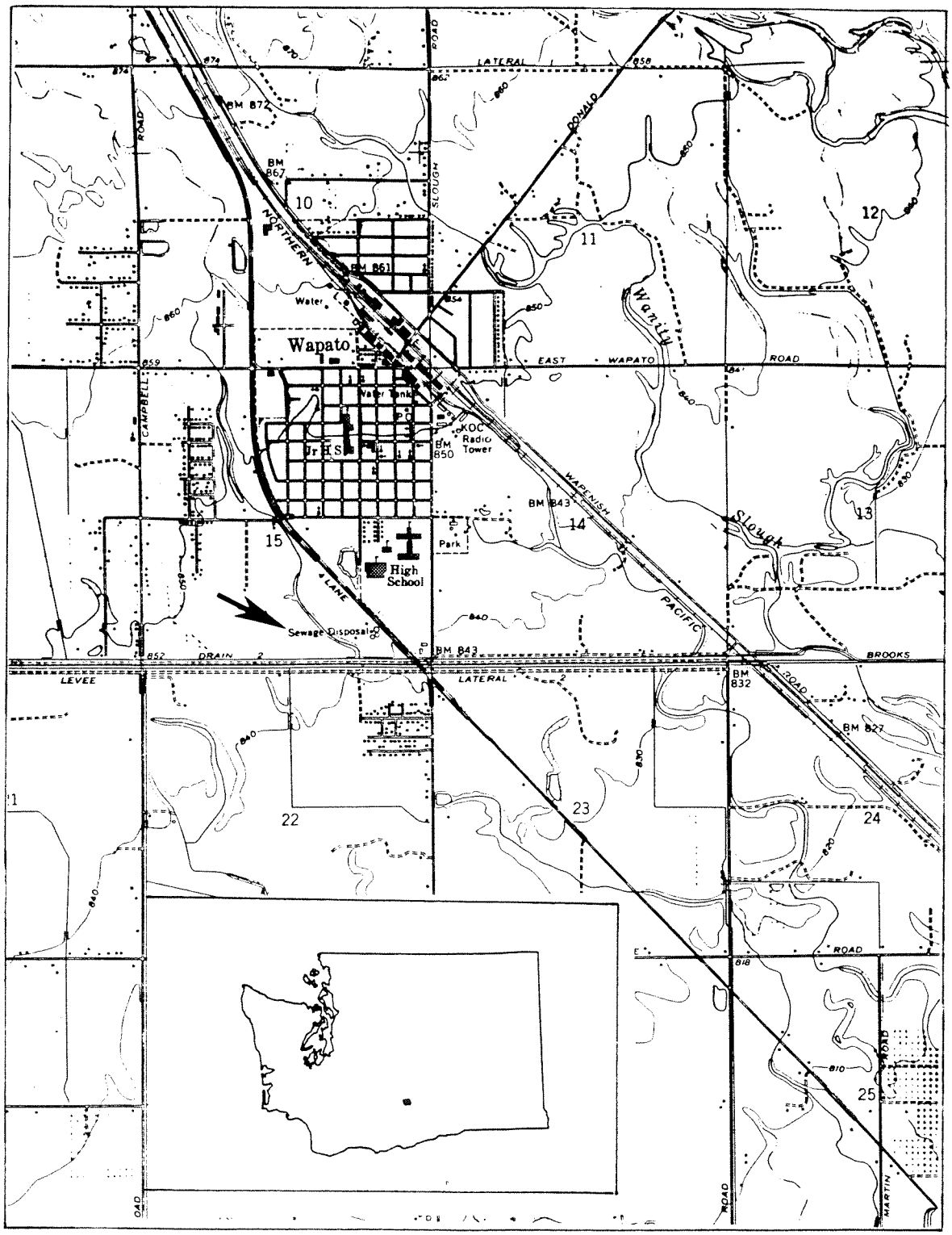

Figure 1. Site location.

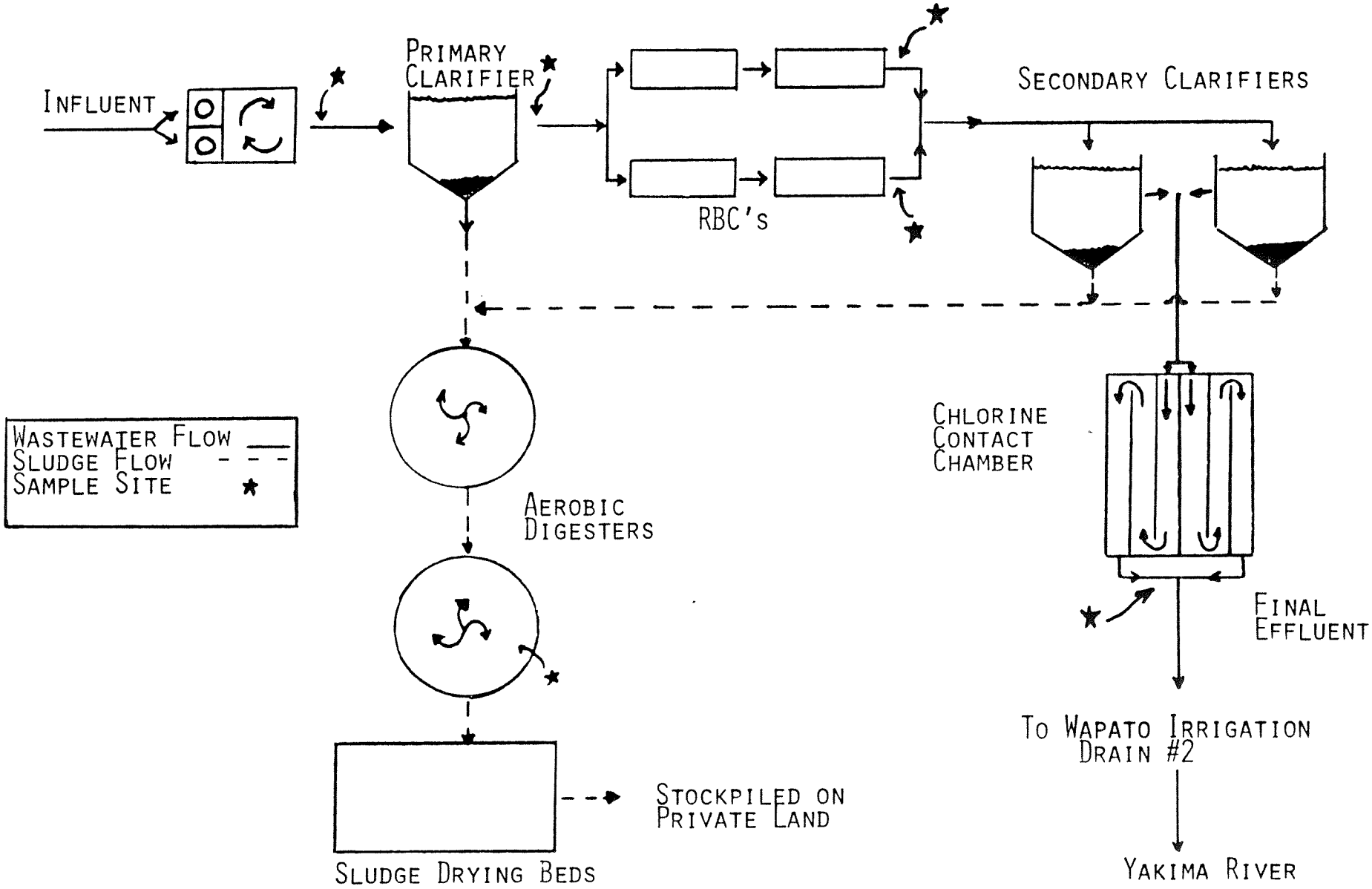

Figure 2. Flow schematic and sample site location: Wapato Class II Inspection, October 6-7, 1987.

Table 1. Ecology Sampling Schedule: Wapato Class II Inspection, October 6-7, 1987.

Station	Date	Time	Field Analyses: Temp. (°C)	pH (S.U.)	Cond. (umhos/cm)	Chlorine Residual (mg/L): Free	Total	Laboratory Analyses: Fecal Coliform (#/100mL)	BOD_5	COD (mg/L)	Solids (mg/L): TS	TNVS	TSS	TNVSS	Turb. (NTU)	Nutrients (mg/L): NH_3-N	NO_2-NO_3-N	Total-P	pH (S.U.)	Cond.(umhos/cm)	Alkalinity (mg/L as $CaCO_3$)	Sulfates (mg/L as SO_4)	Metals mg/kg dry solids	% Solids	SOPP DPA ug/L
Composite																									
Influent:	10/6	15:00	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X				X
	10/7	14:30																							
Effluent:	10/6	15:00	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X				X
	10/7	14:30																							
Grab																									
Influent	10/6	12:40	X	X	X					X			X		X	X	X	X	X	X	X	X			X
	10/7	09:55	X	X	X					X			X		X	X	X	X	X	X	X	X			
	10/7	14:00	X	X	X					X			X		X	X	X	X	X	X	X	X			
Pri Eff	10/6	12:50	X	X	X					X			X		X	X	X	X	X	X	X	X			
	10/7	10:00	X	X	X					X			X		X	X	X	X	X	X	X	X			
RBC #1	10/6	13:00	X	X	X					X			X		X	X	X	X	X	X	X	X			
	10/7	10:10	X	X	X					X			X		X	X	X	X	X	X	X	X			
RBC #2	10/6	13:10	X	X	X					X			X		X	X	X	X	X	X	X	X			
	10/7	10:25	X	X	X					X			X		X	X	X	X	X	X	X	X			
Effluent	10/6	13:20	X	X	X	X	X	X		X			X		X	X	X	X	X	X	X	X			
	10/7	10:40	X	X	X	X	X	X		X			X		X	X	X	X	X	X	X	X			
	10/7	14:15	X	X	X	X	X	X		X			X		X	X	X	X	X	X	X	X			
W.I.D.	10/6	08:15	X	X	X										X		X	X	X	X	X				X
SLUDGE	10/6																						X	X	

Table 2. Parameters Analyzed, Wapato Class II Inspection, October 6-7, 1987.

Station	Date	Time	Sampler	Laboratory	Field Analyses: Temp. (°C)	pH (S.U.)	Cond. (umhos/cm)	Chlorine Residual (mg/L): Free	Total	Laboratory Analyses: Fecal Coliform (#/100mL)	BOD_5 (mg/L)	COD (mg/L)	Solids (mg/L): TS	TNVS	TSS	TNVSS	Turb. (NTU)	Nutrients (mg/L): NH_3-N	NO_2+NO_3-N	Total-P	pH (S.U.)	Cond. (umhos/cm)	Alkalinity (mg/L as $CaCO_3$)	Sulfate (mg/L as SO_4)
Composite																								
Influent:	10/6	15:00	Ecol	WE	8.4	7.4	485				190	380	420	210	110	8	30	13.4	0.11	5.2	7.1	458	140	
	10/7	14:30	Wapato	WE	7.3	7.4	520				270	510	560	240	200	20	42	16.4	0.13	6.3	7.2	446	180	
Effluent:	10/6	15:00	Ecol	WE	8.0	7.4	445				23	64	350	220	12	2	8	9.8	3.70	5.0	7.6	454	110	
	10/7	14:30	Wapato	WE	6.8	7.4	600				22	54	320	200	8	2	8	8.6	4.20	4.6	7.6	419	100	
Grab			Ecol	WE																				
Influent	10/6	12:40			22.0	7.2	470					550			170		29	13.2	0.14	6.6	6.8	483	140	15.0
	10/7	09:55			22.2	7.3	525					540			240		39	20.5	0.10	6.0	7.0	473	180	13.0
	10/7	14:00			22.7	7.2	500					510			130		35	13.1	0.14	5.3	6.5	436	160	17.0
Pri Eff	10/6	12:50			22.1	7.0	580					290			57		22	17.6	0.09	5.8	6.8	559	160	15.0
	10/7	10:00			21.2	7.1	535					320			56		22	20.4	0.08	5.8	7.0	481	160	13.0
RBC #1	10/6	13:00			22.1	7.2	600					110			60		8	14.0	4.10	4.5	7.0	550	130	16.0
	10/7	10:10			21.5	7.1	410					110			50		14	7.4	5.30	3.9	7.2	400	100	28.0
RBC #2	10/6	13:10			22.2	7.3	630					110			58		12	14.9	2.80	4.5	7.1	566	140	15.0
	10/7	10:25			21.5	7.1	430					110			71		14	9.7	3.80	3.9	7.2	422	110	12.0
Effluent	10/6	13:20			22.3	7.1	525	0.2	0.2	180		61			4		6	7.7	3.60	5.6	7.0	512	110	20.0
	10/7	10:40			21.4	7.1	450	0.2	0.3	57		64			13		7	6.8	5.90	5.1	7.2	416	98	18.0
	10/7	14:15			22.0	7.2	465	<0.1	0.1	14		55			7		6	10.5	4.80	4.3	7.3	425	110	13.0
W.I.D.	10/6	08:15			22.5	7.4	149										11		0.02	0.28	7.2	145	69	

There were significant differences between the WTP and Ecology's influent composite sample. In addition, the influent grabs and Ecology's influent composite sample showed substantial differences in Chemical Oxygen Demand (COD) and TSS. The plant apparently receives much lower strength influent during low flows periods, which decreases the overall influent loading to the WTP. Wapato's influent sampling scheme appears to be biased to the high loads of a peak period (8:00 a.m. to 4:00 p.m.): 200 vs 110 mg/L (TSS), 270 vs 190 mg/L (BOD_5), and 510 vs 380 mg/L (COD) compared to Ecology's.

The effluent grab samples and the effluent composite samples show good agreement (Table 2). Ecology's effluent composite sample and Wapato's effluent sample show better agreement than the influent. The similar results affirm that fluctuations in the influent are dampened by the treatment system residence time. The composite influent BOD_5, COD, TSS, and ammonia concentration is of weak to medium strength compared to typical domestic sewage (Metcalf and Eddy, 1972). The COD/BOD_5 ratio (2) is typical of domestic sewage.

The biased results of the influent sampling reaffirms the need for composite samplers by the Wapato's WTP. Composite samplers would provide a representative daily load to the WTP, rather than the biased-high loading that the actual Discharge Monitoring Reports (DMRs) could now reflect.

NPDES Permit Compliance

Comparison of plant effluent parameters to NPDES effluent limitations is shown on Table 3. BOD_5, TSS, fecal coliform counts, and pH were well under permitted limits for both Ecology's and Wapato's composite samplers. Likewise, plant flow was below the design flow of 1.1 MGD. BOD_5 and TSS loading, based on the WTP composite sampler, were well above the plant design criteria. In addition BOD_5 and TSS loadings, based on Ecology's composite samplers, were above the 85 percent design criteria loading, but below the actual design criteria. When the 85 percent design criteria, as stated in the permit, is met or exceeded, a plan for maintaining adequate capacity must be submitted to Ecology.

The marked difference between Ecology's and Wapato's inspection data (Table 3) questions the validity of the WTP composite sampling methodology. The WTP influent sampling scheme overestimates the load to the plant, compared to Ecology's conventional 24-hour sampling (42% on BOD_5, and 80% on TSS). Also, the biased-high influent load overestimates the plant's treatment efficiency (92% vs 88% on BOD_5, and 96% vs 89% on TSS).

Table 4 compares inspection loadings with plant design loading criteria (Ecology, 1985). As stated previously, only the loadings from Wapato's sampling show units overloading (RBC 2.36 vs 2 -lbs/day-1000 sq. ft.-). The loading to the rotating biological contact units (RBC) assume 30 percent BOD_5 removal in the primary clarifier. However the 85 percent design criteria on the RBC is exceeded even on Ecology's sample.

Figures 3 and 4 show BOD_5 and TSS removal based on Wapato's DMR. Figures 5 and 6 show BOD_5 and TSS loadings to the treatment plant. Based on the above figures, influent loading exceeded the WTP's 85 percent design criteria more than 50 percent of the time, and the BOD_5 criteria more than 33 percent of the time.

Table 3. Comparison of Inspection Results to NPDES Permit Effluent Limitations: Wapato Class II Inspection, October 6-7, 1987.

	NPDES Permit Limits				Inspection Data			
Parameter	Monthly Average	Weekly Average	Design Criteria	85 % Loading	Ecology Composite	WTP Composite	Grab Samples	STP Totalizer
Flow (MGD)	1.1		1.1	0.94				0.569
Influent BOD5								
(mg/L)					190.0	270.0		
(lbs/D)			1030	876	901.6	1,281.3		
BOD5								
(mg/L)	30	45			23.0	22.0		
(lbs/D)	155	232			109.1	104.4		
(% removal)					87.9	91.9		
Influent TSS								
(mg/L)					110.0	200.0		
(lbs/D)			790	672	522.0	949.1		
TSS								
(mg/L)	30	45			12.0	8.0		
(lbs/D)	119	178			56.9	38.0		
(% removal)					89.1	96.0		
Fecal coliform	200	400						
(#/100 mL)							180	
pH (S.U.)			6 - 9				7.1 - 7.2	

Table 4. Unit Loadings Wapato Class II Inspection, October 6-7, 1987.

Unit	Size #	Parameter	Inspection Results	Facility + Design Criteria	Peak + Design	State @ Design Criteria
		Flow (MGD)	0.569	1.1	2.5	-
		Influent BOD_5	190 mg/L 902 lbs/day			
		Influent BOD_5 to RBC *	631 lbs/day			
		BOD_5 to RBC **	897 lbs/day			
Primary Clarifier	103,000 gal. 1,964 ft2	Detention time (hrs.)	4.3	2.25	1.0	1.5 - 2.5
		Surface Overflow Rate (gpd/ft2)	290	560	1273	800 - 1200
RBC	380,000 ft2	BOD_5 Loading Total RBC *	1.66	1.9	-	2
		Total RBC **	2.36			2
Secondary Clarifier	65,000 gal. (2) 962 ft2	Detention Time (hrs.)	5.5	2.8	1.25	-
		Surface Overflow Rate (gpd/ft2)	296	572	1300	700
Chlorine Contact Chamber	22,000 gal. (2)	Detention Time (hrs)	1.93	1.0	0.44	1.0

* From Ecology's 24 hr. composite sampling
** From Wapato's 8 hr. grab composite sampling
\# From oral communication with Kim Sherwood
@ (Ecology, 1985)
\+ Wapato NPDES Waste Discharge Permit

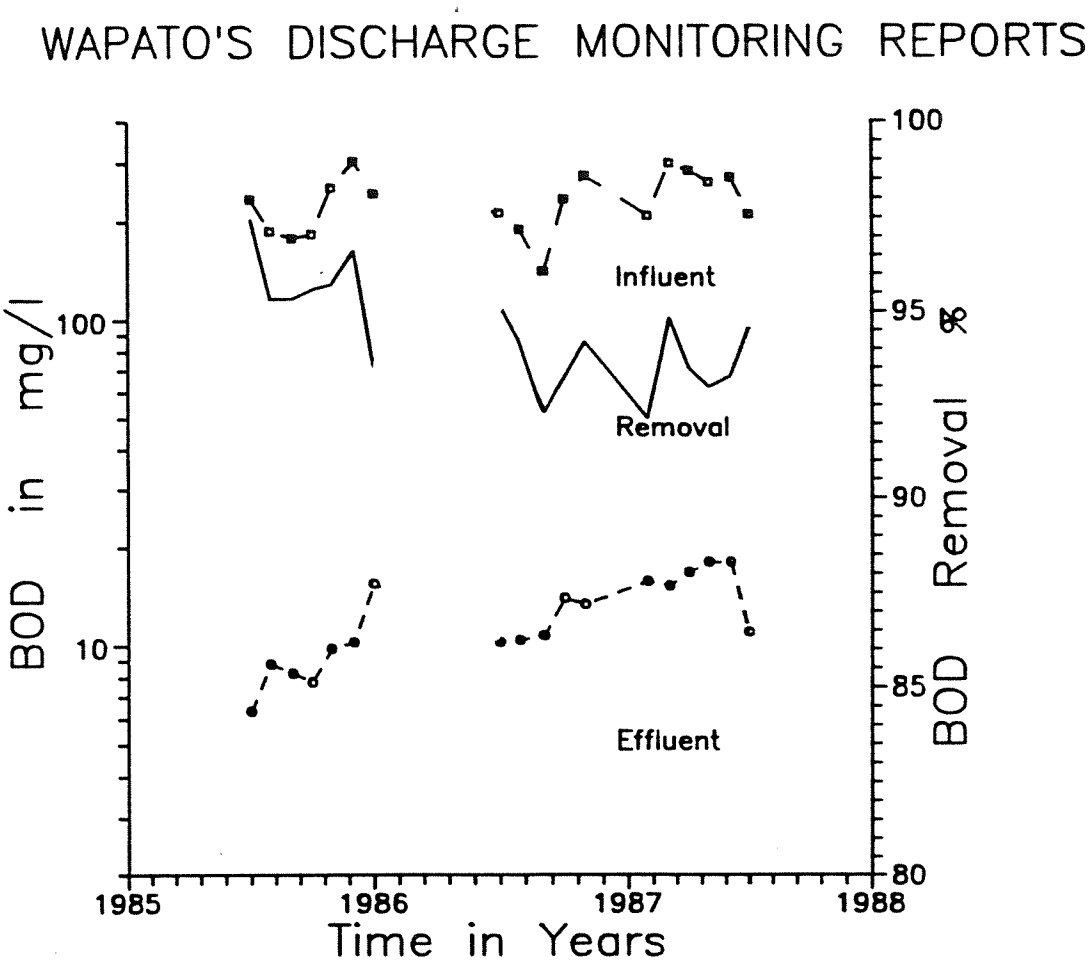

Figure 3. BOD versus Time.

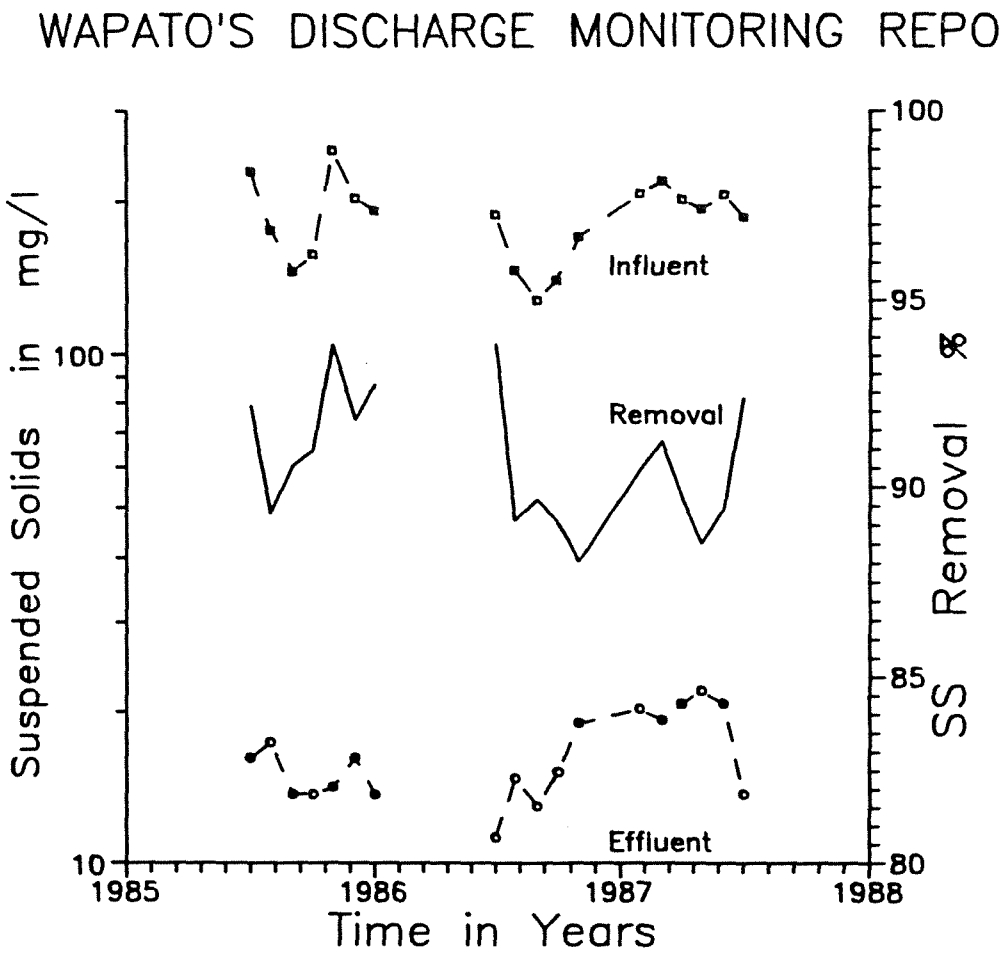

Figure 4. Suspended Solids versus Time.

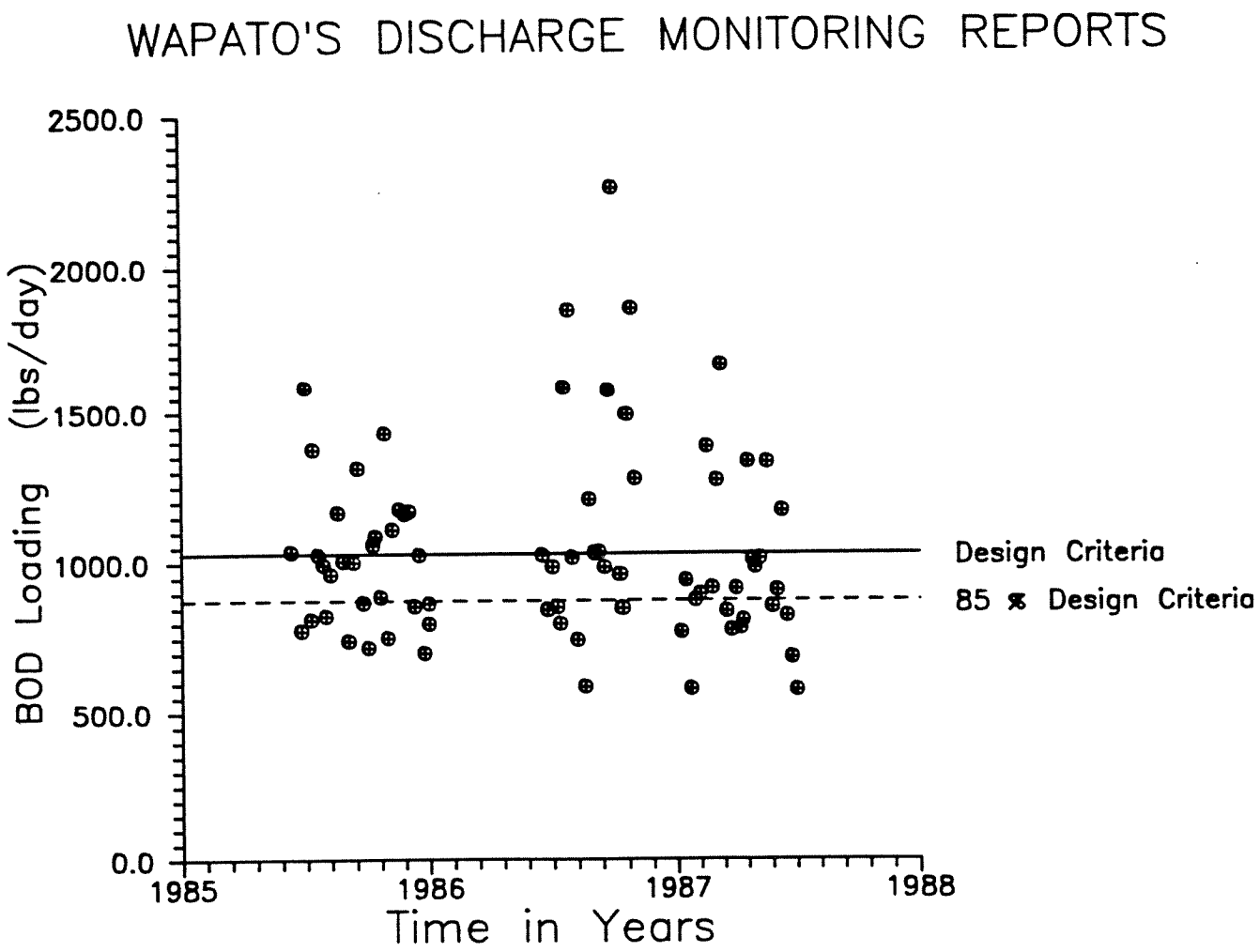

Figure 5. BOD Loading versus Time.

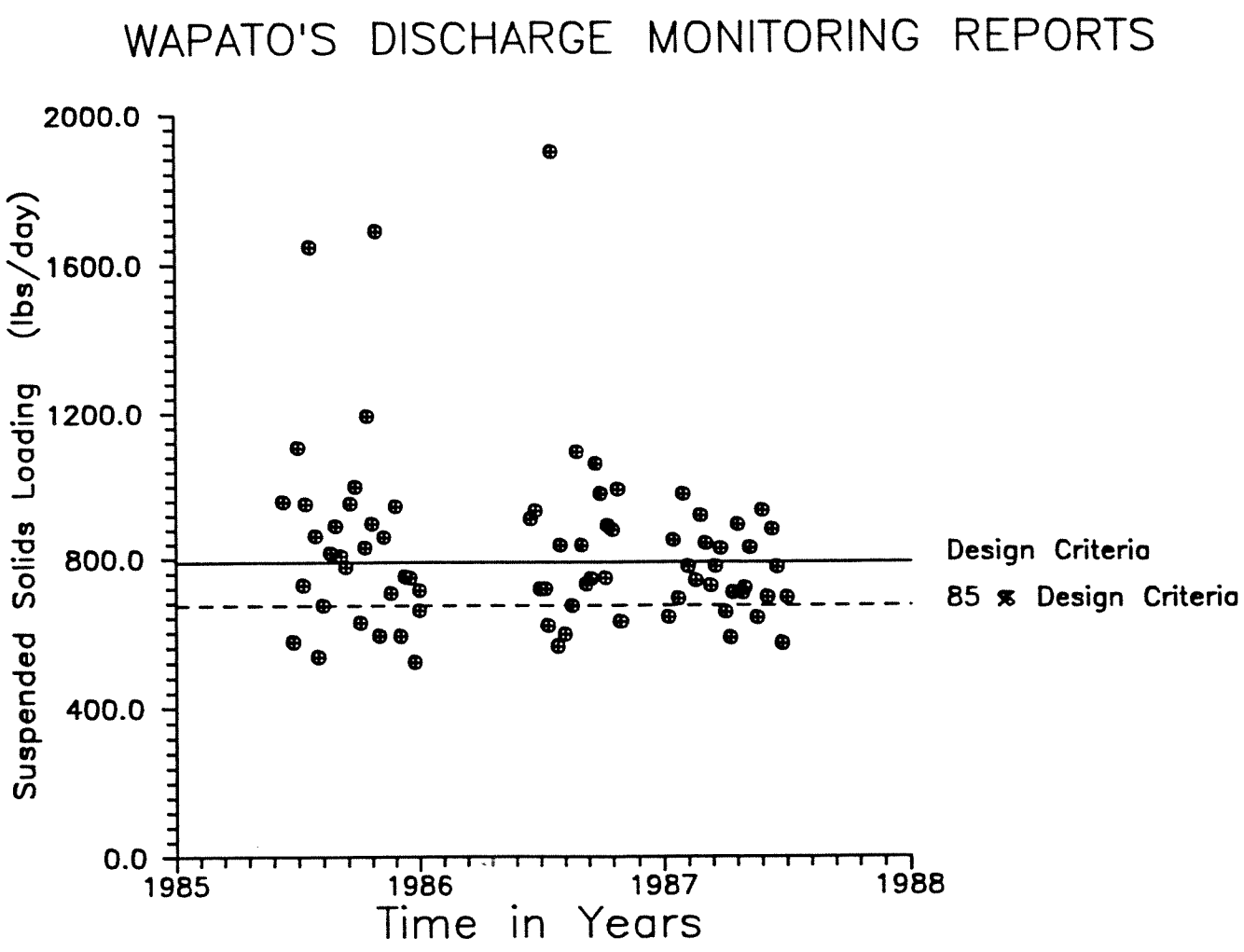

Figure 6. Suspended Solids versus Time.

Laboratory Review

Laboratory procedures at the WTP need some modifications and/or adherence to standards. Some areas where the laboratory was considered deficient or below standards were:

Composite Samples:

1. The WTP needs composite samplers, the actual hand composite sampling overestimates the influent BOD and Suspended Solids (SS) concentration.

2. The sampling lines should be cleaned periodically with the plant's chlorine solution (every three months or more often is suggested).

BOD_5:

1. If the sample has been chlorinated, check for the chlorine residual. If residual chlorine is present, dechlorinate and seed the dilution water. In some samples, chlorine will dissipate within one to two hours of standing in the light.

2. The pH meter should be calibrated every day it is used.

3. The five-day dissolved oxygen (D.O.) depletion of the dilution blank should be 0.2 mg/L or less (APHA, 1985).

4. Adequate amount of seed should be used to cause a D.O. uptake of 0.6 - 1.0 mg/L due to the seed in the sample (APHA, 1985).

5. The D.O. depletion should be at least 2.0 mg/L, and at least 1.0 mg/L D.O. should remain after five days for a BOD test to be valid/reliable (APHA, 1985).

A comparison of Ecology and WTP laboratory results is given in Table 5. Effluent BOD_5 agreed closely, while influent values were within 25 percent of Ecology's results. Although a 25 percent difference in BOD_5 (BOD_5 greater than 200 mg/L) is not a significant disagreement, the high bias in both results should be of concern. The fecal coliform values were in the lower end of the 95 percent confidence limits (151 - 210 FC/100mL), based on the reported number and a normal distribution of the values. Both TSS for the influent were below the acceptable 10 percent variation (99 - 121 Ecology sample; 180 - 220 Wapato sample) for SS in the 100 - 300 mg/L range. One effluent TSS was outside the acceptable 33 percent variation (5 - 12 Wapato sample) for solids in the 15 mg/L range.

Sludge Metals

Sludge metal data is summarized in Table 6. Metals found in the sludge were within ranges found at other RBC and/or trickling filter plants during previous Class II inspections statewide (Hallinan, 1988). Copper is higher than the tentative maximum (Conway, 1980), but lower than the maximum on wastewater sludge composts (500 - 900 mg/kg dry wt; EPA, 1988). However, the tentative maximum content is only a guideline. Sludge with higher metal content could always be applied as long as the maximum metal application rates are observed (EPA,

Table 5. Comparison of laboratory results: Wapato Class II Inspection, October 6-7, 1987.

Station	Date	Time	Sampler	Laboratory	Chlorine Residual (mg/L) Free	Chlorine Residual (mg/L) Total	Fecal Coliform (#/100mL)	BOD5 (mg/L)	TSS (mg/L)
Composite									
Influent	10/6 - 10/7	15:00 - 14:30	Ecology	Ecology				190	110
				Wapato				239	127
		15:00 - 15:00	Wapato	Ecology				270	200
				Wapato				333	230
Effluent	10/6 - 10/7	15:00 - 14:30	Ecology	Ecology				23	12
				Wapato				18	16
		15:00 - 15:00	Wapato	Ecology				22	8
				Wapato				18	16
Grab									
Effluent	10/6	13:20	Ecology	Ecology	0.2	0.2	180		
			Wapato	Wapato			140		

Table 6. Sludge metals results: Wapato Class II Inspection, October 6-7, 1987.

Metal	WTP*** sample (mg/Kg dry wt)	Data from previous inspections* Range (mg/Kg dry wt)	Geometric mean (mg/Kg dry wt)	Number of samples	Maximum ** Content of Dry Sludge (Cropland) (mg/kg)
Cadmium	2.0	0.01 - 16	5.5	17	10
Chromium	32.7	0.4 - 313	40.9	17	-
Copper	305	28 - 3100	532.0	17	100
Lead	132	100 - 1140	284.0	17	1000
Nickel	19.6	12 - 46	28.6	15	200
Zinc	1637	680 - 2500	1620.0	17	2000

* Summary of data collected for digested trickling filter or RBC sludge during previous Class II inspections in the state

** Tentative maximum metal content of sludges for cropland application

*** percent solids = 1.9

1988). EPA's draft sludge regulations address the application rates based on metallic content (Federal Register, 40 CFR Parts 122 *et al.*, May 2, 1989). For copper, application rates would be limited to about 7.5 tonnes per hectacre at a dry weight concentration of 305 mg/kg dry weight (WPCF, 1989).

Priority Pollutants Organics

Results of a series of base-neutral-acid organics (BNAs) scans are given in Table 7. The purpose of the scan was concern for the fungicides SOPP and DPA and their presence in the Wapato Industrial Ditch and thus in the WTP.

The fungicide SOPP was detected both at the WID and the WTP. However, the presence of the fungicide at both sites does not support the hypothesis that the ditch is the source to the wastewater plant. Much "higher" levels were found in the influent grab and composite samples than at the WID. A "lower" value was detected at the WTP composite effluent (EFF-ECO).

Other priority pollutants detected in the four samples were: phenol, dichlorobenzene, 4-methylphenol, benzoic acid, and diethylphthalate. All below the water quality criteria (USDC, 1979; EPA, 1986). In addition, the composite influent sample showed traces of 2,4-dinitrophenol and 4-nitrophenol. In every case, lower values were detected in the effluent (composite) compared to the influent composite or grab.

Phenol concentration (EFF-ECO) is much lower than the data available for acute and chronic toxicity to freshwater aquatic life - 10,200 and 2,560 ug/L, respectively (EPA, 1986). 4-Methyl phenol concentration is lower than values reported on effects to fish - 4.0 to 100 mg/L (McKee, 1963; USDC, 1979).

CONCLUSIONS AND RECOMMENDATIONS

The Wapato WTP discharge was within the NPDES permit effluent limitations. However, influent composite samples show the plant exceeding the 85 percent design criteria. Therefore, the WTP should submit a plan and schedule to maintain adequate treatment capacity. Composite samplers need to be installed to obtain a more representative influent sample/load, and a consistent sampling methodology. Based on the WTP DMRs, the plant receives fluctuating loads on a monthly and weekly basis. The plant personnel should check the nature and variability of these loads and the effects on the WTP.

Recommendations on laboratory procedures are included in the laboratory review section.

Table 7. Organic Priority Pollutant Scan: Wapato Class II Inspection, October 6-7, 1987.

Priority Pollutant	Sites			
BNA Compound	Influent (ug/L)	Wapato Ditch (ug/L)	Inf-Eco (ug/L)	Eff-Eco (ug/L)
Phenol	7	0.8 U	14 J	4
bis(2-Chloroethyl)Ether	4 U	0.8 U	7 U	2 U
2-Chlorophenol	4 U	0.8 U	7 UJ	2 U
1,3-Dichlorobenzene	4 U	0.8 U	7 U	2 U
1,4-Dichlorobenzene	10	0.8 U	7 J	2 U
Benzyl Alcohol	4 U	0.8 U	7 UJ	2 U
1,2-Dichlorobenzene	4 U	0.8 U	7 U	2 U
2-Methylphenol	4 U	0.8 U	7 UJ	2 U
bis(2-chloroisopropyl)ether	4 U	0.8 U	7 U	2 U
4-Methylphenol	46	0.8 U	48 J	3
N-Nitroso-Di-n-Propylamine	4 U	0.8 U	7 U	2 U
Hexachloroethane	4 U	0.8 U	7 U	2 U
Nitrobenzene	4 U	0.8 U	7 U	2 U
Isophorone	4 U	0.8 U	7 U	2 U
2-Nitrophenol	4 U	0.8 U	7 UJ	2 U
2,4-Dimethylphenol	4 U	0.8 U	7 UJ	2 U
Benzoic Acid	21 J	0.8 U	100 J	11
bis(2-Chloroethoxy)Methane	4 U	0.8 U	7 U	2 U
2,4-Dichlorophenol	4 U	0.8 U	7 UJ	2 U
1,2,4-Trichlorobenzene	4 U	0.8 U	7 U	2 U
Naphthalene	4 U	0.8 U	7 U	2 U
4-Chloroaniline	4 U	0.8 U	7 U	2 U
Hexachlorobutadiene	4 U	0.8 U	7 U	2 U
4-Chloro-3-Methylphenol	4 U	0.8 U	7 UJ	2 U
2-Methylnaphthalene	0.2 J	0.8 U	7 U	2 U
Hexachlorocyclopentadiene	4 U	0.8 U	7 U	2 U
2,4,6-Trichlorophenol	4 U	0.8 U	7 UJ	2 U
2,4,5-Trichlorophenol	22 U	4 U	37 UJ	10 U
2-Chloronaphthalene	4 U	0.8 U	7 U	2 U
2-Nitroaniline	22 U	4 U	37 U	10 U
Dimethyl Phthalate	4 U	0.8 U	7 U	2 U
Acenaphthylene	4 U	0.8 U	7 U	2 U
3-Nitroaniline	22 U	4 U	37 U	10 U
Acenaphthene	4 U	0.8 U	7 U	2 U
2,4-Dinitrophenol	22 U	4 U	37 UJ	10 U
4-Nitrophenol	22 U	4 U	37 UJ	10 U
Dibenzofuran	4 U	0.8 U	7 U	2 U
2,4-Dinitrotoluene	4 U	0.8 U	7 U	2 U
2,6-Dinitrotoluene	4 U	0.8 U	7 U	2 U
Diethylphthalate	14	0.8 U	13	1 J
4-Chlorophenyl-phenylether	4 U	0.8 U	7 U	2 U
Fluorene	4 U	0.8 U	7 U	2 U
4-Nitroaniline	22 U	4 U	37 U	10 U
4,6-Dinitro-2-Methylphenol	22 U	4 U	37 UJ	10 U
N-Nitrosodiphenylamine	11 B	2 B	10 B	2 UB
4-Bromophenyl-phenylether	4 U	0.8 U	7 U	2 U

Table 7. (continued)

Priority Pollutant BNA Compound	Sites Influent (ug/L)	Wapato Ditch (ug/L)	Inf-Eco (ug/L)	Eff-Eco (ug/L)
Hexachlorobenzene	4 U	0.8 U	7 U	2 U
Pentachlorophenol	22 U	4 U	37 UJ	10 U
Phenanthrene	0.4 J	0.8 U	7 U	2 U
Anthracene	4 U	0.8 U	7 U	2 U
Di-n-Butylphthalate	2 BJ	0.4 BJ	2 BJ	1 BJ
Fluoranthene	**0.4 J**	0.8 U	**0.5 J**	2 U
Pyrene	0.4 J	0.8 U	**0.6 J**	2 U
Butylbenxylphthalate	3 BJ	0.8 UB	3 BJ	2 UB
3,3'-Dichlorobenzidine	9 U	2 U	15 U	4 U
Benzo(a)Anthracene	4 U	0.8 U	7 U	2 U
bis(2-Ethylhexyl)Phthalate	26 B	2 B	27 B	9 B
Chrysene	4 U	0.8 U	7 U	2 U
Di-n-Octyl Phthalate	3 BJ	0.8 UB	9 B	7 B
Benzo(b)Fluoranthene	4 U	0.8 U	7 U	2 U
Benzo(k)Fluoranthene	4 U	0.8 U	7 U	2 U
Benzo(a)Pyrene	4 U	0.8 U	7 U	2 U
Indeno(1,2,3-cd)Pyrene	4 U	**0.2 J**	**1 J**	**0.2 J**
Dibenz(a,h)Anthracene	4 U	0.8 U	**0.6 J**	**0.2 J**
Benzo(ghi)Perylene	4 U	0.8 U	7 U	2 U
Ortho Phenol phenol	4 UJ	**0.3 J**	**11 J**	**0.9 J**

U = Compound was analyzed for, but not detected, at the given detection limit

B = Used when the analyte is found in the blank as well as the sample. Indicates possible/probable blank contamination.

J = An estimated value when result is less than specified detection limit

M = An estimated value of analyte found and confirmed by analyst but with low spectral match parameters.

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